

# Chemical and Biological National Security Program

## *Lawrence Livermore National Laboratory*

**The mission of the LLNL Chemical & Biological National Security Program (CBNP) is to develop and field advanced strategies that dramatically improve the nation's capabilities to prevent, prepare for, detect, and respond to terrorist use of chemical or biological warfare agents.**

The science, technology, and integrated systems we provide are developed with key partners, stake holders, and end users

These activities reside within the Non-proliferation, Arms Control, and International Security Directorate (NAI) and the Homeland Security Organization (HSO) at the Lawrence Livermore National Laboratory.

Our primary customers are the Department of Energy, the Department of Defense and the Department of Homeland Security.

## Background

As a DOE national security laboratory, LLNL has a long history of supporting nuclear nonproliferation and national security policy.

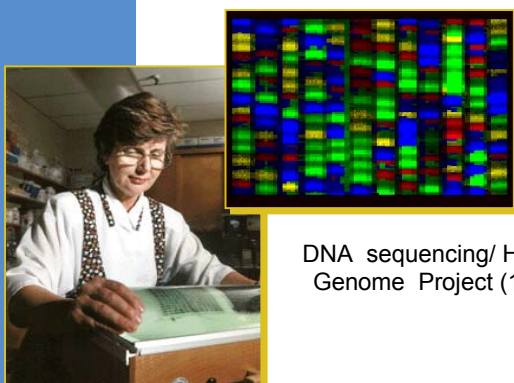
Early successes of the LLNL CBNP were achieved by leveraging several ongoing programs at the Laboratory. We have a long history of involvement in national security, including nonproliferation of weapons of mass destruction. In the areas of biology and biotechnology, LLNL played a key role in starting and implementing the Human Genome Project and, more recently, the Microbial Genome Program.

Our program's early focus on biodetection followed an assessment of the challenges and gaps associated with counter bioterrorism. Because medical interventions are more effective when administered soon after or even before exposure to a pathogen, great value can be derived by detecting exposure as early

as possible. We initiated a development process to put a series of systems with new capabilities in the field—systems with a focus on an environmental monitoring concept called “detect to treat.” Anticipating the importance of commercialization to make our systems and technologies broadly available, we also implemented the practices and priorities needed to work with industry technologies and capabilities, in partnership with other National Laboratories, universities and the private sector.

Our strategy for countering chemical and biological threats uses a multi-layered approach. This includes:

- Enhance the Nations ability to prevent, prepare for, and respond to chemical or biological terrorism
- Emphasize collaborative demonstration projects
- Provide capability for earlier detection
- Implement an effective response, consequence management, and attribution system
- Prepare for a large-scale event with an unexpected agent
- Maintain a capability for science-based threat and vulnerability characterization



DNA sequencing/ Human Genome Project (1987)

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### **Key Focus areas**

We have ongoing research and development efforts in a number of key areas. Some of our efforts underway:

- Investigate new “signatures” associated with biological and chemical warfare agents.
- Because many biological agents occur naturally, we must be able to discriminate between terrorist activities involving an agent and naturally occurring background levels of that agent. Thus, we are working to establish baseline observations of background and near-neighbor signatures
- Because our biology and signature-discovery projects produce potential leads for medical countermeasures, we are beginning to explore mechanisms and partners that can bridge the gap between promising agent-specific binding discoveries and actual pharmaceutical development
- Develop systems that can be integrated into public health and scaled to emerging and engineered threats



### **Science and Technology**

Together with the Centers for Disease Control and Prevention (CDC), our pathogen signatures have been developed into assays for the Laboratory Response Network (LRN).

Our partnership with the CDC greatly enhances the utility of our systems in public health. Looking to the future of detection and identification, we are investigating host-based signatures that can provide earlier detection of infection and determination of risk. We also are developing a fast-response (less than a second) aerosol mass spectrometer that analyzes single particles and may have several applications, including “detect to warn” and medical and contamination triage.

### **Planning**

We contribute to the planning process through exercises designed to evaluate the systems, tools, and technologies intended for response. Such exercises yield valuable information for other aspects of readiness—e.g., sensor networks, conduct of operations, and improved placement of interventions. .

### **System demonstrations and pilot programs**

Integrating new technologies into systems that can perform in real-world conditions is essential. The LLNL CBNP emphasizes collaborative demonstration programs as part of our development strategy.

The demonstration programs that we are currently participating in include integration of atmospheric and dispersion models for first responder and local government planners and decision makers, biological forensics, rapid restoration of operations of a major transportation hub after biological contamination, and response to agricultural bioterrorism.

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From applied science to deployed systems –  
decontamination, incident modeling,  
instrumentation and applied biological  
science